



Inženýrsko – výrobní elektrotechnický podnik, a.s.

619 00 Brno, Videnska 117

TEST PROTOCOL No. 80 – 12940

**VTs 36, VTs 38 Instrument Voltage
Transformers**

(testing station stamp)

(signature)
Ing. Jaromir Mudra, CSc.

In Brno on: 9 November 1998

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		TEST PROTOCOL No. 80 – 12940 Test subject: VTS 36, VTS 38 Instrument voltage transformers		Page: 1 Number of pages: 6																								
Type: VTS 38 VTS 36		Test type: type Tested according to: CSN 35 1360																										
Rated values: <table border="0"> <tr> <td>Rated prim. voltages</td> <td>35/.3kV</td> <td>30/.3kV</td> </tr> <tr> <td>Rated load</td> <td>50VA</td> <td>50VA</td> </tr> <tr> <td></td> <td>100VA</td> <td>200VA</td> </tr> <tr> <td>Accuracy class</td> <td>0.5/6P</td> <td>0.5/6P</td> </tr> <tr> <td>System highest voltage:</td> <td>38 kV</td> <td>36 kV</td> </tr> <tr> <td>Extreme load</td> <td>500VA</td> <td>500 VA</td> </tr> <tr> <td>Rated secondary voltage</td> <td colspan="2">100/.3V and 100/3V</td> </tr> <tr> <td>Rated frequency</td> <td colspan="2">50 Hz</td> </tr> </table>		Rated prim. voltages	35/.3kV	30/.3kV	Rated load	50VA	50VA		100VA	200VA	Accuracy class	0.5/6P	0.5/6P	System highest voltage:	38 kV	36 kV	Extreme load	500VA	500 VA	Rated secondary voltage	100/.3V and 100/3V		Rated frequency	50 Hz		Test customer: KPB INTRA s.r.o. Fucikova 860 685 01 Bucovice Order number: KPB INTRA Z - 980041 dated 19 July 1998 Sample registration numbers: Reg. No. 215-217/98 Serial No. 001848-001850 Drawing No.: KPB-T-0701 Atmospheric conditions: Temperature: Pressure: Humidity:		
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Product manufacturer: KPB INTRA s.r.o. Fucikova 860 685 01 Bucovice		Protocol contains: Text pages: 6 Tables: 2 Oscillograms: Diagrams: Drawings: Photographs:		Table of distribution: KPB INTRA 3x IVEP RT 2x IVEP archive 1x																								
Samples delivered on: 22 July 1998																												
Test results: VTS 38, VTS 36 instrument voltage transformers, produced by KPB INTRA s.r.o. in design 35/.3 kV and 30/.3 kV comply with type test according to CSN 35 1360. (Stamp and signature)																												
Test date: 27 July 1998 22 October 1998		Tested by: Ing. Jaromir Mudra, CSc. Ing. Vlastimil Rada (signature)		Testing station chief: Ing. Jaromir Mudra, CSc.																								

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VST 38

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Based on the order of KPB INTRA s.r.o. No. Z-980041, a type test was performed at 3 pcs of instrument voltage transformers type VTS 36 and VTS 38 pursuant to CSN 35 1360. These are single-pole insulated inductive instrument transformers of voltage with rated transfers 30000/.3//100/.3/100/3V and 35000/.3//100/.3/100/3 V that are designed for powering of measuring and securing instruments in grids with ineffectively grounded zero point and the highest system voltage of 36 and 38 kV.

The secondary windings marked a-n are designed for measuring the electricity and da-dn for powering the protections.

These label data were verified by tests:

Instrument voltage transformer VTS 36 - rated primary voltage 30000/.3V

Serial number 001850

Winding a-n - 50 VA, class 0.5
Winding da- dn - 200 VA, class 6P
Insulation level - 36/80/180 kV
Thermal insulation class - E

Instrument voltage transformers VTS 38 - rated primary voltage 35000/.3V

Serial number 001848

Winding a-n - 50 VA, class 0.5
Winding da- dn - 100 VA, class 6P
Insulation level - 38/80/180 kV

Serial number 001849

Winding a-n - 50 VA, class 0.5
Winding da- dn - 100 VA, class 6P
Extreme load - 500 VA
Thermal insulation class - E
Insulation level - 38/80/180 kV

The type test was performed according to CSN 35 1360 in this scope:

1. Correct terminal marking check
2. Accuracy measurement
3. Test of thread insulation
4. Insulation test by impulse voltage
5. Insulation test by alternate voltage
6. Heating test

1. Correct terminal marking check

The check of polarity of primary and secondary winding was performed using the indication instrument when measuring accuracy. The transformers comply with standard CSN 351360, Art. 120.



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2. Accuracy measurement

The accuracy measuring was performed using the compensation method with a measuring bridge Hartmann & Braun AG, system Keller, type MEWK, s. no. 640 6857, verification sheet no. LPM /451/94. Furthermore, these following instruments were used for measuring:

Normal voltage: Measuring transformer of voltage by Messwandler - Gallspach, type NUZG 35
Serial number: 72/454315
Verification sheet no. CM 10/115/48/94

Voltage load of measuring winding:

- a) producer Hartman & Braun AG, type NBKa,
s. no. 3154032, verification sheet no. LPM/451/94
- b) Tettex 3683/KS, s. no. 136626, verification sheet no. CM 114/1/083/95

The measured values of voltage and angle errors of measuring windings a-n in the range 80, 100, and 120 % U_N are stated in table No. 1.

Table No. 1

Transfer		80% U_N	100% U_N	120% U_N	$P_N VA_{a-n}$
30000/.3//100/.3V s.no. 001850	ε [%]	+0.41	+0.41	+0.41	12.5
	δ [']	+0.25	+0.40	+0.50	
	ε [%]	0	0	-0.01	50
	δ [']	+1.25	+1.35	+1.40	
35000/.3//100/.3V s.no. 001848	ε [%]	+0.35	+0.35	+0.35	12.5
	δ [']	+0.55	+0.65	+0.75	
	ε [%]	-0.07	-0.07	-0.07	50
	δ [']	+1.80	+1.85	+2.0	
35000/.3//100/.3V s.no. 001849	ε [%]	+0.25	+0.25	+0.25	12.5
	δ [']	-0.20	-0.10	-0.05	
	ε [%]	-0.10	-0.10	-0.10	50
	δ [']	-0.20	-0.10	-0.05	

The measuring windings with transfers 30000/.3//100/.3 V and 35000/.3//100/.3 V comply with the required accuracy class of 0.5.



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Measured values of voltage and angle errors of auxiliary windings da-dn in the range of 2 - 190 % U_N are stated in Table No. 2.

Table No. 2

Transfer		2% U_N	100% U_N	190% U_N	P_N VA da— dn	P_N VA a-n
30000/.3//100/3 V s.no. 001850	ε [%]	+1.10	+1.30	+1.25	50	0
	δ [']	+15.80	+13.50	+15.20		
	ε [%]	+0.80	+1.0	+0.95	50	50
	δ [']	+13.20	+11.45	+12.90		
	ε [%]	-1.46	-1.55	-1.65	200	50
	δ [']	+52.40	+47.80	+49.50		
	ε [%]	-1.80	-1.35	-1.30	200	0
	δ [']	+50.0	+49.90	+51.30		
35000/.3//100/3 V s.no. 001848	ε [%]	-0.80	-0.35	-0.45	25	0
	δ [']	+15.50	+13.80	+15.50		
	ε [%]	-1.15	-0.70	-0.75	25	50
	δ [']	+11.0	+10.8	+11.50		
	ε [%]	-3.90	-3.65	-3.80	100	50
	δ [']	+58.20	+57.0	+57.50		
	ε [%]	-3.60	-3.30	-3.50	100	0
	δ [']	+62.50	+61.50	+62.0		



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Table No. 2 Continued

Transfer		2% U_N	100% U_N	190% U_N	$\frac{P_N}{da} - \frac{VA}{dn}$	$\frac{P_N}{a-n} - \frac{VA}{a-n}$
35000/.3//100/3 V s.no. 001849	ε [%]	-0.75	-0.45	-0.50	25	0
	δ [']	+15.0	+15.50	+16.50		
	ε [%]	-1.05	-0.75	-0.80	25	50
	δ [']	+9.50	+10.0	+12.50		
	ε [%]	-3.65	-3.65	-3.+80	100	50
	δ [']	+59.0	+62.50	+63.0'		
	ε [%]	-3.40	-3.40	-3.60	100	0
	δ [']	+64.0	+66.50	+67.50		

Auxiliary windings of the voltage transformer with transfers 30000/.3//100/3V and 35000/.3//100/3V comply with the accuracy class 6P.

3. Thread Insulation Test

The test was performed with alternate voltage 200 Hz from the primary side of the transformer for 30 seconds at the measuring transformers of voltage s. no. 001848 to 001850, see protocol of IVEP Brno No. 82-0641.
The transformers complied with standard CSN 35 1360 Art. 125.

4. Insulation test using impulse voltage

The test was performed using an shock wave of shape 1.2/50 μ s at the measuring transformers of voltage s. no. 001848 to 001850, see the protocol of IVEP Brno no. 82-0641.
The transformers complied with standard CSN 35 1360 Art. 123.

5. Insulation test using alternate voltage

The test was performed using alternate voltage according to standard CSN 35 1360 Art. 124 between these parts of transformers:

- Insulation between the measuring and auxiliary windings
- Insulation between the secondary windings and the grounded skeleton
- Insulation of the primary winding terminal that is grounded in operation

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Measuring transformers of voltage s. no. 001848 to 001850 passed the performed tests.

6. Heating Test

The test was performed according to standard CSN 35 1360 Art. 126 at the measuring transformers of voltage s. no. 001849 and 001850.

a) With extreme load 500 VA, $\cos \beta = 1$ at winding a-n.

The winding da-dn was not loaded.

The test was performed at the measuring transformer s. no. 001849 with transfer 35000/.3//100/.//100/3V.

The measured values of heating:

Primary winding terminals A-N	- 32.0 °C
Measuring winding terminals a-n	- 42.0 °C
Auxiliary winding terminals da-dn	- 39.5 °C

Ambient temperature $t=20$ °C

The measured values of winding heating comply with standard CSN 35 1360 Art. 126 for insulation class E.

b) With increased voltage $1.9 U_N$ and rated secondary loads at the measuring windings a-n (50 VA) and auxiliary windings da-dn (100 and 200 VA) for a period of 8 hours that followed the heating test at $1.2 U_N$.

The measured heating values:

	35/.3kV	30/.3 kV
Primary winding terminals A-N	- 36.0 °C	55.0 °C
Measuring winding terminals a-n	- 34.0 °C	67.0 °C
Auxiliary winding terminals da-dn	- 33.0 °C	66.0 °C

Ambient temperature $t=20$ °C

The measured values of winding heating comply with standard CSN 35 1360 Art. 126 for insulation class E.

7. Conclusion

The tested instrument transformers of voltage type VTS 36 and VTS 38, producer KPB Intra passed the type test according to CSN 35 1360.

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